CLAIMS

1. A method of manufacturing a composite material comprising:

forming a mixture comprising a plurality of fibers and a borazine oligomer;

subjecting the mixture to a first heating, for 12 hours to 56 hours; and

subjecting the mixture to a second heating;

wherein the temperature of the first heating is 60 °C to 80 °C, and the pressure during the first heating is at least 0.5 MPa,

the temperature of the second heating is at most 400 °C, and the greatest pressure of the second heating is at least 15 MPa.

2. The method of claim 1, further comprising subjecting the mixture to a third heating, wherein the temperature of the third heating is at least 1200 °C.

3. The method of claim 1, wherein the borazine oligomer is obtained by heating borazine for 24 to 48 hours, at a temperature of 60 °C to 80 °C.

4. The method of claim 1, wherein the fibers are carbon fibers.

5. The method of claim 1, wherein the pressure during the first heating is 1 MPa to 6 MPa.

6. The method of claim 1, wherein the temperature of the first heating is 65 °C to 75 °C, and the pressure during the first heating is 1.5 MPa to 5 MPa.

7. The method of claim 1, wherein the temperature of the first heating is 68 °C to 72 °C, and the pressure during the first heating is 2.0 MPa to 4.6 MPa.

8. The method of claim 1, wherein the temperature of the second heating is increased at a rate of 0.25 °C/min to 3 °C/min.

9. The method of claim 1, wherein the temperature of the second heating is increased at a rate of 0.75 °C/min to 1.25 °C/min.

10. The method of claim 1, wherein the temperature of the second heating is increased at a rate of 0.9 °C/min to 1.1 °C/min.

11. The method of claim 1, wherein the greatest temperature reached during the second heating is 130 °C to 170 °C, and the greatest pressure is 12 MPa to 32 MPa.

12. The method of claim 1, wherein the greatest temperature reached during the second heating is 140 °C to 160 °C, and the greatest pressure is 16 MPa to 26 MPa.

13. The method of claim 1, wherein the greatest temperature reached during the second heating is 148 °C to 152 °C, and the greatest pressure is 21 MPa to 23 MPa.

14. The composite material made according to the method of claim 1.

15. The composite material made according to the method of claim 2.

16. The composite material made according to the method of claim 3.

17. A composite material comprising carbon fibers in a boron nitride matrix, wherein the composite material has a density of at least 1.62 g/cc.

18. The composite material of claim 17, wherein the composite material has a density of 1.62 to 1.75 g/cc.

19. A composite material comprising carbon fibers in a boron nitride matrix, wherein the composite material has a wear rate of at most 0.4 mg/m at an energy level of 100 kJ/kg to 1100 kJ/kg, and a coefficient of friction of at least 0.22 at an energy level of 100 kJ/kg to 1200 kJ/kg.

20. A method of manufacturing a composite material comprising boron nitride, comprising:

forming a mixture comprising a preform and a borazine oligomer;

subjecting the mixture to a first heating, for 12 hours to 56 hours; and

subjecting the mixture to a second heating;

wherein the temperature of the first heating is 60 °C to 80 °C, and the pressure of the first heating is at least 0.5 MPa, and

the temperature of the second heating is at most 400 °C, and the greatest pressure of the second heating is at least 15 MPa.

21. The method of claim 20, further comprising subjecting the mixture to a third heating, wherein the temperature of the third heating is at least 1200 °C.

22. The method of claim 20, wherein the borazine oligomer is obtained by heating borazine for 24 to 48 hours, at a temperature of 60 °C to 80 °C.

23. The method of claim 20, wherein the preform is a 3D needled carbon fiber preform.

24. The method of claim 20, wherein the preform is a CVI-infiltrated 3D needled carbon fiber preform.

25. The composite material made according to the method of claim 20.

26. The composite material made according to the method of claim 21.

27. A composite material comprising a 3D needled carbon fiber preform impregnated with boron nitride having a density of at least 1.63 g/cc.

28. The composite material of claim 27, having a density of 1.63 g/cc to 1.72 g/cc.

29. A composite material, comprising CVI-infiltrated carbon fiber preform impregnated with boron nitride having a density of at least 1.62 g/ cc.

30. The composite material of claim 29, having a density of 1.62 to 1.80 g/cc.

31. A composite material comprising a 3D needled carbon fiber preform impregnated with boron nitride having a wear rate of at most 0.05 mg/m at an energy level of 100 kJ/kg to 1000 kJ/kg, and a coefficient of friction of at least 0.12 at an energy level of 100 kJ/kg to 900 kJ/kg.

32. A brake for aircraft comprising the composite material of claim 17.

33. A brake for aircraft comprising the composite material of claim 27.

34. An aircraft comprising the brake of claim 32.

35. An aircraft comprising the brake of claim 33.

36. A method for decelerating an aircraft comprising braking the aircraft with the brake of claim 32.

37. A method for decelerating an aircraft comprising braking the aircraft with the brake of claim 33.